

## Natural intensions

Article (Published Version)

Chrisley, Ron (2007) Natural intensions. Interdisciplines [web conference: adaptation and representation, 29 October 2007].

This version is available from Sussex Research Online: <http://sro.sussex.ac.uk/id/eprint/28552/>

This document is made available in accordance with publisher policies and may differ from the published version or from the version of record. If you wish to cite this item you are advised to consult the publisher's version. Please see the URL above for details on accessing the published version.

### **Copyright and reuse:**

Sussex Research Online is a digital repository of the research output of the University.

Copyright and all moral rights to the version of the paper presented here belong to the individual author(s) and/or other copyright owners. To the extent reasonable and practicable, the material made available in SRO has been checked for eligibility before being made available.

Copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational, or not-for-profit purposes without prior permission or charge, provided that the authors, title and full bibliographic details are credited, a hyperlink and/or URL is given for the original metadata page and the content is not changed in any way.

<http://www.interdisciplines.org/adaptation/papers/15>

## Natural Intensions de Ron Chrisley

### I

There is an attractive way to explain representation in terms of adaptivity; roughly:

- An item R represents a state of affairs S if it has the proper function of co-occurring with S (that is, if the ancestors of R co-occurred with S and this co-occurrence explains why R was selected for, and thus why R exists now; cf, e.g., (Millikan 1984)).

Call any such explanation a *biosemantic* account. Although biosemantic accounts may be adequate explanations of the extension or reference of R, what they often neglect is an account of the intension or sense or aspectual shape of R: *how* S is represented by R. As Fodor puts it, "*Darwin cares how many flies you eat, but not what description you eat them under.*" (Fodor 1990:73, original emphasis). [Philosopher's nit-pick: In offering this slogan Fodor assumes, incorrectly, and possibly unintentionally, that all senses are descriptive. To avoid leaving open the possibility of a teleological account of non-descriptive (e.g. demonstrative) sense, we can modify the slogan to be: "*Darwin cares how many flies you eat, but not what mode of presentation you eat them under.*"] If Fodor is right, a full account of representation needs to address this neglect.

For some people, that's a big "if". Millikan herself, for example, thinks that the biosemantic approach already has the materials necessary to give an account of intensions. Call it the "consumer is always right" story: roughly, the way R represents S depends on the proper functions of the processes that use R. So a state of the visual system in a frog that detects and represents flies represents them *as* flies (and not black dots, say) because the mechanism that uses these representations, the frog's tongue-snapping mechanism, only fulfills its proper function of getting food into the frog's stomach when it snaps at flies.

The "consumer is always right" story is not without its own problems:

1. Circular: The "consumer is always right" story seems to beg, rather than answer, the question of aspectual shape. Fodor's slogan applies even more directly to the case of the tongue-snapping consumer of R than it does to R itself. Snapping at "black dots" will reliably allow the mechanism to fulfill its proper function in any environment where the cost of snapping at non-fly black dots is outweighed by the benefit of snapping at black dots that are flies.

Explaining the intensions of representations in terms of the intensions of the proper functions of consumers of those representations is circular.

2. Non-deterministic I: The story massively underdetermines the intension of R, because there are an infinite number of intensions that correctly characterize the things that allow, e.g., the tongue-snapping mechanism to fulfill its proper function: *flies*, yes, but also *flies smaller than a house*, *flies larger than an atom*, *fly-sized organisms*, *fly-sized animals*, *fly-sized insects*, *digestible fly-sized stuff*, etc.
3. Non-deterministic II: Representations typically have more than one consumer. Or they may exist for some time without having any consumers. In either case, which consumer's proper function are we to appeal to in determining the intension of the representation in question? It would seem that there is no fact of the matter in these cases as to how the representation is representing the world. Why then, should we expect there to be a fact of the matter in the cases where, by chance, there only happens to be one consumer? You don't turn the duck-rabbit into an unambiguous rabbit figure by killing off every person except those who have no concept of duck.
4. Facile: The story makes it an *a priori* truth that there is a match between the intension of R and the proper functions of the consumers of R; the consumer is *always* right, we are told. This is convenient; too convenient. A more satisfying account would give independent accounts of R's intension on one hand, and the proper functions of the consumers of R on the other, and explain the fitness of some organisms in terms of a match between these, by way of contrast with the low fitness of those organisms that did not benefit from such a match. But this can only be done if one's account does not render such a contrast conceptually impossible.

Millikan and the other biosemanticists may have successfully addressed most or all of these problems. On the other hand, there may be problems with the story, not listed above, that they have not dealt with adequately. In any case, what follows will assume an interest in the general biosemantic approach to providing an adaptivity-based explanation of representation, but also an interest in finding an alternative to the "consumer is always right" account of intension.

One might start out by trying to apply the notion of proper function to intension in a way similar to how it was applied to extension. Having this or that intension is just another property of R, so one could say:

- *Direct biosemantic account of intension (first try)*: R has the proper function of having intension I just in case the ancestors of R had intension I and their having that property explains why R was selected for, and thus why R exists now.

This suggestion fails to reproduce an important feature of the direct biosemantic account of extension. The power of that account lies in the fact that it promises to explain an intentional relation in terms of non-intentional (or non-problematically intentional) relations, by reducing "referring to S" to "having the proper function of co-occurring with S". Reference is replaced with mere co-occurrence and the (purportedly) naturalistically acceptable notion of a proper function.

The first try at a direct biosemantic account of intension does not reproduce this feat. It fails to reduce the having of an intension to the proper function of having some other property. It gives us an account of R having the proper function of having intension I, in terms of R having intension I, when what we want is an account of R having intension I in the first place. A better attempt would be of the form:

- *Direct biosemantic account of intension (second try):* A representation R has the intension I if it has proper function X.

The problem is that no one to my knowledge has any idea of what could be non-circularly substituted for X.

Perhaps such a close parallel with reference is unnecessary. The reason for invoking proper functions was to allow us to explain an intentional relation in terms of naturalistic ones. But once that feat is achieved, why must it be repeated? Once we have broken into the intentional circle via extension, it may be possible to explicate other intentional notions, especially intension, in terms of extension and other purely naturalistic notions, without needing to invoke proper functions again. No doubt such an account would be complex, appealing to the mechanisms by which R fulfils its extension-fixing proper function, and perhaps even the mechanisms by which the consumers of R fulfill their proper functions.

On the other hand, once one has an account of reference in place, it might be that giving an account of the intension of a particular representation is a relatively straightforward affair, having only to do with its causal role. Given a representation and its referent, there is a set of intensions that determine that referent; the intension of the representation is the member of this set that best matches the causal role of that representation in the cognitive economy of the organism. If one wants to add a biosemantic twist, one can deem these causal roles to be the missing X in the second try, above, and deem the actual intension of R to be whatever causal role explains the success of R's ancestors.

## II

Beyond the suggestions just given, I will not try to give a complete account of intension here. However, an important step toward such an account, whether or not it is of the suggested form, may be made by identifying the norms that govern intensions. Just as the norms of validity and Bayes' Theorem can guide investigations into the actual inferences and probabilistic reasoning, respectively, that organisms perform, so also there may be a norm or set of norms that can do the same for an investigation into intension-determination. That is, answering the question "what intension is this organism using?" may be made easier, especially in an adaptationist context, by first answering the question "what intension *should* this organism be using?".

Some might balk at the idea of an intension being right or wrong. As long as you represent true things about an object, isn't *how* you represent that object a matter of preference? But examples of norms on intension use are easy to find:

- Communication: If Tom asks you "Will Mike be at the seminar today?", it is in some sense incorrect to answer "Lefty will be there", even if Mike is Lefty, if you have reason to believe that Tom doesn't know Mike is Lefty. If you don't think proper names have intensions, substitute "the smartest guy in town" and "the tallest guy on campus" for "Mike" and "Lefty".
- Deductive inference: On traditional views, the inference:

The Morning Star is bright  
 The Morning Star is far away  
 Therefore, there is something that is both bright and far away

is valid, whereas the inference:

The Morning Star is bright  
 The Evening Star is far away  
 Therefore, there is something that is both bright and far away

is not. The choice of the intension of "The Evening Star" is inappropriate in this context.

- A similar point can be made for the case of inductive inference.

These examples are offered to establish that the idea of uses of intensions being governed by a norm makes sense. With this established, one can revisit the suggestions at the end of the previous section in a different light: instead of an account of the actual intension of a representation, perhaps the suggested accounts provide us with a norm to be used in providing such an account. That is,

intentions are causal roles, and R *should* have the causal role that explains why R's ancestors were selected for (although it may not actually have that intension).

Cognitive scientists may have their worries. It might be that temporal externalism (historical determination) of reference isn't a problem for psychological explanation, since many cognitive scientists (especially computationalists) lean toward a kind of internalism where the extension of a representation plays no causal (and therefore no explanatory) role anyway. But if a biosemantic account is given of intension as well, then it might be thought that this poses a threat to causal/computational psychological explanation, since intensions will be individuated temporally externally (historically), while only temporally local distinctions can make a causal difference in the here and now. (As far as I am aware, the earliest use of the phrase "temporal externalism", at least in this sense, is in (Chrisley 1993)). Millikan (Millikan 1993) considers this worry, but rejects the causal model of explanation that fuels it, preferring instead a biological model of explanation, in which history can and does play a role. But for those who think assimilation into biology isn't natural enough for true naturalization, the worry may remain. It needn't: The proposal here is only that biosemantics (with its temporal externalism) provide the norm for what counts as the best (or most natural) intension in a given context; the current causal powers of R themselves determine what the actual intension of R is. The possibility of a computational psychology is restored.

### III

In the midst of this apparently happy situation, a problem lurks. I have until now assumed that the biosemantic account of extension was fine, and that all that was needed was a supplemental account of intension, be it biosemantic or otherwise. But upon further reflection, the direct biosemantic account of extension cannot be what we want.

Consider the case of a hypothetical biological representation T: a tiger detector. The direct account would have it that T represents the presence of tigers because it was the co-occurrence of the ancestors of T with tigers that explains why T was selected for and is thus here today. Hence no matter what the status of the intension of T may be, the extension of T is clear: tigers.

But something funny has happened here. Suppose there had been 100 ancestors of T, T<sub>1</sub> to T<sub>100</sub>, and each of them enabled the organism they had been in to survive by being tokened in the presence of a particular tiger: Tony<sub>1</sub> to Tony<sub>100</sub>. Then surely the set  $Z = \{\text{Tony}_1, \text{Tony}_2, \dots, \text{Tony}_{100}\}$  is the true extension of T, according to the biosemantic account. For it was co-occurrence of the ancestors of T with the members of Z that explains why T is around today. But if Z is the extension of T, then T can never be true of any tiger in existence today; thus, all T-tokenings are

misrepresentations (unless, by chance, Tony100 still happens to be alive and in the vicinity; but you get my point). Further, the intension of T cannot be "tigers" or anything usefully general like that, as the extension of that intension includes, obviously, all tigers that have been, are now, or are yet to come. And that extension is a lot bigger than Z (to put it mildly). This can be seen as an extensional version of the problem of reduced content (Peacocke 1992, pp 129-132).

So if Z isn't the extension of T, what is? And what is the relation, if any, between it and Z? Let's call Z the proto-extension of T. The challenge is to use Z to find something that determines a more plausible extension of T (such as the set of all tigers). Once we have the extension of T, then we can worry about its intension. Yes, it could very well be that the proto-extension Z determines the intension of T directly, and this in turn is what determines the true extension of T. But we shouldn't assume this restriction at the outset. In particular, I want to leave room for the possibility that while the proto-extension of T, Z, determines a "natural" intension I that in turn determines the true extension of T, the actual intension of T may be distinct from I (even though it will necessarily have the same extension as I).

It may be hard to imagine how one can get from Z to I: clearly, I cannot be one of the intensions that have Z as their extension, since we want I's extension to be something much bigger (and more useful) than Z, such as the set of all tigers. On the other hand, we don't want Z to be extensionally relevant to I; as proto-extension, Z should play some role in determining I and thus T's true extension. How are we to find this middle way?

By way of closing, I offer an answer to this question based on the notion of complexity. There may be other, better, ways of doing it, but the following can at least serve as an example of what a solution looks like. The proposal is this:

- *Natural extension*: Given a representation T with ancestral proto-extension Z, the natural extension of T is the extension of whatever intension I makes the best trade-off between covering Z on the one hand, and being of low complexity on the other.

Before discussing the trade-off itself, let me clarify each of the quantities being held in the balance. By "covering" Z, I just mean how well the extension of I matches Z. There are two kinds of extensional error possible here: inclusive and exclusive. The inclusive error of I relative to a proto-extension Z is the set of objects that are in I's extension but are not in Z; the exclusive error is the set of objects that are not in I's extension but are in Z. A rough measure of the total extensional error of I relative to Z is the size of the union of these inclusive and exclusive error sets (the case of intensions with infinite extensions requires a more sophisticated treatment, but there is no space to develop that here).



Clearly, extensional error is minimized when the extension of I just is Z: no inclusive and no exclusive error. So any intension that has Z as its extension would do. This would be useless for our purposes, however, since we want a principled way of establishing the extension of T to be something much larger than Z.

That is the point of the trade-off. What prevents I from being an intension with Z as its extension is the need to balance covering Z well with optimizing something else. In my proposal, that something else is simplicity (low complexity). For example, one could designate a canonical language L within which to express any given intension, and deem the complexity of an intension I to be the minimum description length of I in L: the fewest number of words it takes to express I in L.

To see how this would work, consider the above example of T, its 100 ancestors T1 to T100, and its ancestral proto-extension  $Z = \{\text{Tony1}, \text{Tony2}, \dots, \text{Tony100}\}$ . Let L be English. Suppose, the sake of explication:

- There has only ever been, and only ever will be, 150 tigers;
- There are only two candidate intensions,  $I1 = \text{"Tony1 or Tony2 or, ..., or Tony100"}$  and  $I2 = \text{"tigers"}$ ;
- The total cost of an intension I relative to Z is just the extensional error of I relative to Z plus the minimum description length of I in L.

Then the “cost” of  $I1$  is:

- 0 extensional error, plus at least 100 for the 100 “Tony”s in its canonical expression in L = at least 100

But the cost of  $I2$  is:

- 50 (inclusive) extension error (the 50 tigers in the extension of  $I2$  that are not in Z) + 1 (the length of  $I2$ ’s canonical expression in L) = 51

So the natural extension of T is the extension of  $I2$ , that is, the set of all 150 tigers. This is so even though the proto-extension Z only contained 50 tigers.

In addition to being a solution to our problem, this account has some salutary side-effects. There is only room enough for one example here. Sceptics of the biosemantic approach often wonder: how



many generations does an item T have to enable avoiding a tigery death before it becomes a tiger detector? This account gives a definite answer: at whatever point the “tiger” intension becomes the intension with best trade-off between simplicity and covering the things that co-occurred with the ancestors of T.

On the other hand, there are some obvious difficulties with the simplistic version of the account presented here. For starters:

- **Relativity:** Since complexity is relative to the canonical language L being used, so also is the natural extension of a representation.
- **Free parameter:** Which extension turns out for be natural depends on how one calculates the trade off between extensional error and simplicity. How many objects in the error set is a one-word reduction in description length “worth”? What is the “proper exchange rate” between these quantities? Is there a fact of the matter about this? How could we possibly come to know it?
- **Complexity is not the same as length:** Some concepts seem more “costly” than others. If so, an expression of an intension might be quite short (one word, even), but more intuitively complex in that it uses an “expensive” concept, whereas the expression of another, possibly even co-extension intension might be longer, but only use simple, “cheap” concepts.
- **Whose complexity?:** The account as expressed above uses complexity in the theorist’s language L as a determinant of the natural extension. But surely it is complexity in the organism’s own language that matters? If so, what about organisms that do not possess a language? How are we to measure the complexity of their intensions? Does it make sense to talk about the complexity of an intension with a conceptual (or non-conceptual) scheme?
- **Non-determinism:** What about cases in which there is more than one intension with same overall score, but different extensions? Which extension is the natural extension?

All of these are fair points, and deserve attention, response and rebuttal that cannot be given here; they should, to be sure, be the jumping-off point for further development of the account. However, once the notion of a natural extension is in place, the question of what the natural or “right” *intension* is, as well as the possibly distinct question of what the *actual* intension is, may finally be addressed.

## References

Chrisley, R. (1992) "Externalism before language: The real reason why 'thoughts ain't in the head'". Paper read to the University of Sussex Philosophy Society, March 12th, 1993. Available at

<http://www.cogs.susx.ac.uk/users/ronc/papers/externalism.pdf> .

Fodor, J. (1990) *A Theory of Content and Other Essays*. Cambridge: MIT Press.

Millikan, R. (1984) *Language, Thought and Other Biological Categories: New Foundations for Realism*. Cambridge: MIT Press.

Millikan, R. (1993) “White Queen Psychology; or, The Last Myth of the Given”, in Millikan, R. (1993) *White Queen Psychology and Other Essays for Alice*. Cambridge: MIT Press.

Peacocke, C. (1992) *A Study of Concepts*. Cambridge: MIT Press.